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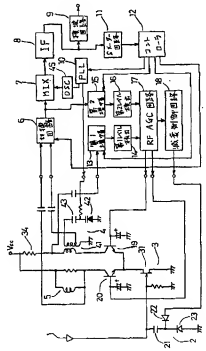
(54)【発明の名称】　ＡＭラジオ受信機

(57)【要約】

【目的】　受信放送局周波数の２倍または１／２倍の周波数をもつ放送局によって発生する混信を防止する。

【構成】　ＡＧＣ回路を備えるＡＭラジオ受信機において、コントローラ１２は、受信放送局の２倍または１／２倍の周波数の局を受信させ、前記局の電界強度が所定以上である時、第１及び第２増幅回路のゲインを大きくしＡＧＣ回路の感度を上げると共に、ＲＦ同調回路４から広帯域増幅回路５に切り換えることによって、受信放送局の感度抑圧を抑え、混信を防止する。



1　　2

【特許請求の範囲】

【請求項1】　AGC回路を備えたAMラジオ受信機において、希望放送局の受信後前記希望放送局の2倍または1／2倍の少なくとも一方の周波数をもつ局を受信させる手段と、前記局の電界強度が所定レベルであるか否か検出する手段と、前記電界強度が所定レベル以上である時AGC回路の感度を上げると共に広帯域RF信号が混合回路に印加されるように動作させる手段を備えたことを特徴とするAMラジオ受信機。

【請求項2】　希望放送局の受信後前記希望放送局の1／2倍及び2倍の周波数をもつ局を受信させる手段を備えたことを特徴とする請求項1記載のAMラジオ受信機。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、混信の発生を抑えるAMラジオ受信機に関し、特に、特定周波数関係となる2信号妨害を排除するAMラジオ受信機に関する。

【0002】

【従来の技術】従来のAMラジオ受信機は図2の如く構成されており、RF同調回路52から発生する受信RF信号のレベルが所定以上になった時、RFAGC回路57及び減衰制御回路58は動作を開始する。RFAGC回路57はAGCトランジスタ61のベースに印加されているベース電圧を低下させて、RF増幅器51のFET62のドレインに供給される電流を制限する。また、減衰制御回路58は減衰回路59に電圧を印加することによって、減衰回路59内のPINダイオードを“ON”させてアンテナを介した受信RF信号の一部をアースに流し、RF増幅器51のFET62のゲートに印加される受信RF信号のレベルを制限する。このように、受信RF信号のレベルが所定以上にならないようにしていた。

【0003】

【発明が解決しようとする課題】しかしながら、図2のAMラジオ受信機において、FET61に受信RF信号が印加された場合、FETは非線形素子であり、その2乗特性から高調波が発生する。即ち、ドレインに流れる電流をID、飽和ドレイン電流をIDSS、ゲート・ソース間電圧をVGS、ピンチオフ電圧をVPとすると、FETのドレイン電流は

【0004】

【数1】

$$I_D = I_{DSS}\left(1-\frac{V_{GS}}{V_P}\right)^2 \quad \cdots\cdots(1)$$

【0005】と表わされる。ここで、FETのゲートに2つの信号$V_S = m_1 \sin w_1 t + m_2 \sin w_2 t$（$w_1$，$w_2$はそれぞれ2つの信号の角周波数）が印加されると

【0006】

【数2】

$$I_D = I_{DSS}\left\{1+\frac{2m_1\sin w_1 t + 2m_2\sin w_2 t}{V_P}\right\}^2 +$$

$$\frac{1}{V_P^4}\left(\frac{m_1^2+m_2^2}{2}-\frac{m_1^2\cos 2w_1 t + m_2^2\cos 2w_2 t}{2}-\right.$$

$$\left. m_1 m_2\cos(w_1+w_2)t + m_1 m_2\cos(w_1-w_2)t\right\} \quad \cdots\cdots(2)$$

【0007】となり、FETからw_1，w_2，$2w_1$，$2w_2$，w_1+w_2，w_1-w_2の高調波が発生する。即ち、周波数f_1，f_2，$2f_1$，$2f_2$，f_1+f_2，f_1-f_2の信号が発生する。例えば、希望局周波数をf_2、他の局をf_1（$=1/2\times f_2$）とすると、f_1の2倍の高調波は周波数がf_2となるので$2f_1$の高調波はRF同調回路によって遮断されず、MIX段・IF段を通過し検波される。よって、f_1の周波数に放送局が存在する場合、AMラジオ受信機は混信を発生する。また、希望放送局をf_2、他の局をf_1（$=2\times f_2$）とすると、f_1のf_1-f_2の高調波がf_2となり、上述同様に混信が発生する。

【0008】上記の2信号妨害による混信を抑制する為、図2のAMラジオ受信機ではAGC感度を常時上げていたが、前記2信号妨害を発生する局以外のレベルが大である周波数信号が印加された場合、FETから高調波が発生せず妨害が発生しないが、感度抑圧が発生し希望放送局の感度が低く抑えられるという問題があった。

【0009】

【課題を解決するための手段】本発明は上述の点を鑑み成されたものであり、AGC回路を備えたAM受信機において、希望放送局の受信後前記希望放送局の2倍または1／2倍の少なくとも一方の周波数をもつ局を受信させる手段と、前記局の電界強度が所定レベルであるか否か検出する手段と、前記電界強度が所定レベル以上である時AGC回路の感度を上げると共に広帯域RF信号が混合回路に印加されるように動作させる手段とを備えたことを特徴とする。

【0010】また、希望放送局受信後前記希望放送局の1／2倍及び2倍の周波数をもつ妨害局を受信させる手

段とを備えたことを特徴とする。

【００１１】

【作用】本発明に依れば、ＡＭラジオ受信機が希望の放送局を受信した後、希望放送局周波数の２倍及び１／２倍の周波数をもつ放送局を受信し各々の放送局の電界強度を検出し所定レベル以上であるか否かを判別する。電界強度が所定以上のものであると判断された時、ＲＦ装帯域信号からＲＦ広帯域信号が混合回路に印加されるようにすると共に、ＡＧＣ回路の感度を上げる。その後、ＡＭラジオ受信機は希望放送局を受信し通常動作となる。

【００１２】

【実施例】図１は本発明の一実施例を示す図である。１はアンテナ、２は受信ＲＦ信号を減衰させる減衰回路、３は受信ＲＦ信号を増幅するＲＦ増幅回路、４は受信ＲＦ信号を同調するＲＦ同調回路、５は広帯域増幅器、６はＲＦ同調回路４又は広帯域増幅器５の出力を選択する切換回路、７はＩＦ信号を発生する混合器、８はＩＦ信号を増幅するＩＦアンプ、９はＩＦ信号を検波する検波器、４５は局発信号を発生するＯＳＣ、１０はＯＳＣ４５を制御するＰＬＬ回路、１１は放送局の電界強度を検出するＳメータ回路、１２はコントローラ、１３は抵抗３４の一端から発生する出力信号を増幅する第１増幅回路、１４は第１増幅回路から発生する信号のレベルを検出する第１レベル検出回路、１５は切換回路６から発生する信号を増幅する第２増幅回路、１６は第２増幅回路から発生する雑音のレベルを検出する第２レベル検出回路、１７はＡＧＣ回路を発生するＲＦＡＧＣ回路、１８は減衰回路の減衰量を制御する減衰制御回路であり、１９及び２０はベースにＡＧＣ信号が印加されるＡＧＣトランジスタである。

【００１３】また、図１において、減衰回路２は、直列接続されたコンデンサー２１及びＰＩＮダイオード２３と、カソードがコンデンサー２１とＰＩＮダイオード２３との接続点に接続されるＰＩＮダイオード２２とから成る。ＲＦ増幅回路３は、ゲートに受信ＲＦ信号が印加されるＦＥＴ３１によって構成される。ＲＦ同調回路４は、トランジスタ１９のコレクタに接続されるコイル４１と、コイル４１とＲＣ並列回路を成しているコンデンサー４３及びバリキャップコンデンサー４２とから成る。また、広帯域増幅器５は、ＲＦ増幅器３と兼用となるＦＥＴ３１と、ＦＥＴ３１のドレインにＡＧＣトランジスタ２０を介して接続される抵抗及びコイルとから成る。

【００１４】次に図１のＡＭラジオ受信機の動作を図３のフローチャートを参照して説明する。図１において、Ｓ２における初期条件として切換回路６はＲＦ同調回路の出力信号を発生するようにコントローラ１２によって選択され、第１及び第２増幅回路の増幅率は第１の増幅率と成されている。アンテナ１に入力された受信ＲＦ信号は、ＲＦ増幅回路３で増幅され、ＲＦ同調回路４で周波数選択され、混合回路７において、ＯＳＣ４５の局発信号と混合され、所定のＩＦ信号に変換される。そして、ＯＳＣ４５の局発信号の周波数を可変すると同時に、ＲＦ同調回路４の同調周波数を可変することによって選局が行われる。

【００１５】Ｓ３において、希望放送局が受信される。希望放送局の周波数をf_0とする。Ｓ４において、コントローラ１２はＰＬＬ回路１０を制御して、ＲＦ同調回路４の同調周波数及びＯＳＣ４５から発生する局部発振周波数を可変し、希望放送局の２倍の周波数、$2\times f_0$の受信状態にする。この状態のままＳメータ回路１１において、ＩＦアンプ８から発生するＩＦ信号を整流することにより、周波数$2\times f_0$の放送局の電界強度を検出する。Ｓメータ回路１１から発生した電界強度値はコントローラ１２において所定レベルＡより大きいか否かを判別される。前記電界強度値が所定レベルより小さい時、Ｓ５に移る。

【００１６】また、コントローラ１２において、ＰＬＬ回路１０が制御される前に、周波数$2\times f_0$が受信バンド内に存在しない場合もＳ４に移り、存在する場合、上述の動作が行われる。Ｓ５に移り、Ｓ４と同様にコントローラ１２はＰＬＬ回路１０を制御して希望放送局周波数の１／２倍・$1/2\times f_0$の受信状態とする時、コントローラ１２において、周波数$1/2\times f_0$が受信バンド内に存在するか判別する。受信バンド内に有る時、受信ＲＦ信号が$1/2\times f_0$の周波数となるように、ＰＬＬ回路１０が制御される。この状態でＳメータ回路１１は、周波数$1/2\times f_0$の放送局の電界強度を検出する。コントローラ１２において、検出した電界強度が所定レベルＢより大きいか否か判別される。所定レベルＢより小さいと判別した時、または、周波数$1/2\times f_0$が受信バンド内に無い時、Ｓ７に移る。

【００１７】また、Ｓ４及びＳ５において、コントローラ１２がＳメータ回路１１から検出された電界強度を所定レベル以上の大きさであると判別した場合、Ｓ６に移り、コントローラ１２は切換回路６に切換信号を発生し、切換回路６は広帯域増幅器５の出力信号を混合回路７に印加するように切換わる。また、コントローラ１２は第１及び第２増幅回路１３及び１５を制御し、第１及び第２増幅回路１３及び１５の増幅率を第１の増幅率より大きい第２の増幅率と成される。以上の動作後、Ｓ７に移る。

【００１８】Ｓ７において、受信ＲＦ信号をf_0に戻し、ＡＭラジオ受信機は希望放送局を受信し通常動作になる。通常動作において、抵抗３４の一端から発生する出力信号は第１増幅回路１３において増幅され、第１レベル検出回路１４に印加される。第１レベル検出回路１４において、Ｖ－Ｉ変換することによって、抵抗３４の一端から発生する出力信号のレベルを検出する。抵抗３

４の一端から発生する出力信号は、ＦＥＴ３１に流れる電流の大きさを表わしている。また、切換回路６の出力信号が第２増幅回路１５で増幅され、第２レベル検出回路１６に印加される。第２レベル検出回路１６において、Ｖ－Ｉ変換することによって、切換回路６の出力信号のレベルを検出する。第１及び第２レベル検出回路から発生する検出電流によりＲＦＡＧＣ回路１７及び減衰制御回路１８が動作する。前記検出電流に基づき、ＲＦＡＧＣ回路１７はＡＧＣトランジスタ１９及び２０に印加するベース電圧を制御することによってＦＥＴ３１のソース・ドレイン間の電圧を制御することによって、ＲＦ増幅回路３の増幅率が制御され、また、減衰制御回路１８は減衰回路２に印加する電圧を制御することにより受信ＲＦ信号を減衰させることにより、受信ＲＦ信号のレベルを制御する。以上の動作により、ＡＧＣ動作が行われている。

【００１９】

【発明の効果】本発明に依れば、希望受信局の２倍及び１／２倍の周波数をもつ放送局が所定レベル以上の電界強度をもつ時、非線形素子を持つＲＦ同調回路から非線形素子を持たない広帯域増幅器に切換えると共に、ＡＧＣ回路の感度を上げることにより受信ＲＦ信号のレベルを低く制限するので、混信の発生を抑えることができる。

【図面の簡単な説明】

【図１】本発明の一実施例を示す図である。

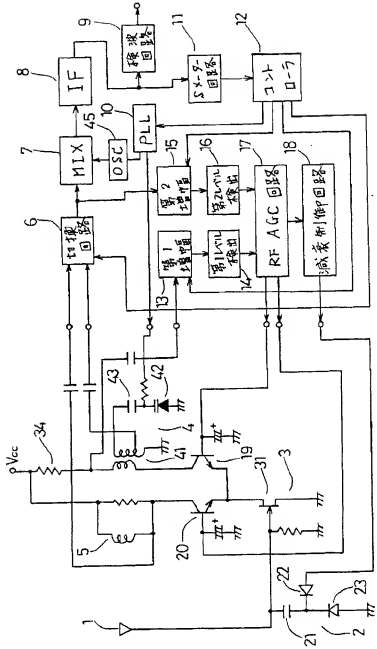
【図２】従来例を示す図である。

【図３】実施例の動作を説明するフローチャートである。

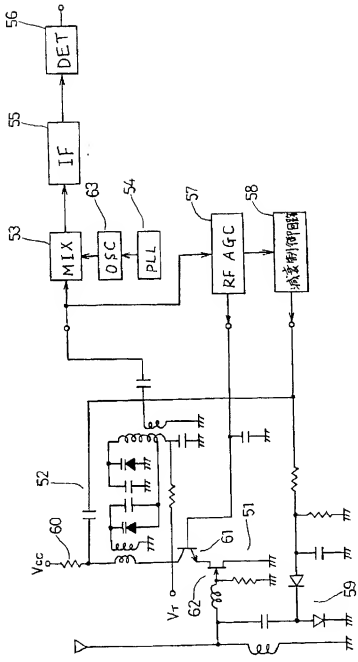
【符号の説明】

１	アンテナ
２，５９	減衰回路
３，５１	ＲＦ増幅回路
４，５２	ＲＦ同調回路
５	広帯域増幅回路
１３，１５	第１及び第２増幅回路
１４，１６	第１及び第２レベル検出回路

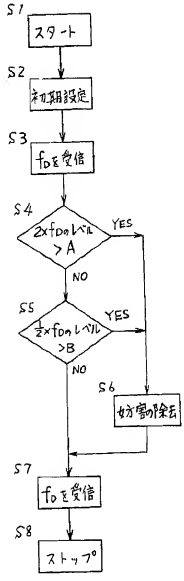
【図1】


IF
MIX
OSC
PLL
コントロール
RF AGC回路
減衰制御回路
検波回路
スイッチ回路
第1検波
第2検波
第1レベル検出
第2レベル検出
Vcc

【図2】


56
DET
55
IF
63
54
57
58
53
MIX
OSC
PLL
RF AGC
52
60
51
61
59
62
Vcc
Vr

【図3】


S1
スタート
S2
初期設定
S3
fDを受信
S4
2×fDのレベル
>A
YES
NO
S5
½×fDのレベル
>B
YES
NO
S6
妨害の除去
S7
fDを受信
S8
ストップ

PATENT ABSTRACTS OF JAPAN

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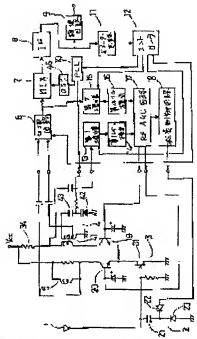
(72)Inventor : SUGAYAMA SAKAE

(54) AM RADIO RECEIVE

(57)Abstract:
PURPOSE: To prevent interference generated by a broadcasting station having a frequency which is 2 or 1/2 multiple of the frequency of a receiving broadcasting station.
CONSTITUTION: In an AM radio receiver equipped with an AGC circuit, the station having the frequency which is 2 or 1/2 multiple of the frequency of the receiving broadcasting station is received by a controller 12. Then, when the electric field strength of the station is more than a prescribed value, the gains of first and second amplifier circuits are increased, the sensitivity of the AGC circuit is increased, and an RF tuning circuit 4 is switched to a wide band amplifier circuit 5. Thus, the sensitivity suppression of the receiving broadcasting station can be suppressed, and interference can be prevented.



LEGAL STATUS

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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	3197686
[Date of registration]	08.06.2001
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] AM radio set characterize by to have a means make a station with one [of the broadcasting station wishing the account of receiving back to front of the broadcasting station of choice / at least] twice or 1/2 twice as many frequency as this receive in AM radio set equipped with the AGC circuit , a means detect whether the field strength of said station is predetermined level , and a means make it operate so that a broadband RF signal may be impress to a mixing circuit , while raise the sensibility of an AGC circuit , when said field strength is more than predetermined level .
[Claim 2] AM radio set according to claim 1 characterized by having a means to make a station with the 1/2 and twice as many frequency of the broadcasting station wishing the account of receiving back to front of the broadcasting station of choice as this receive.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to AM radio set which eliminates 2 signal active jamming which serves as specific frequency relation especially about AM radio set which suppresses generating of interference.

[0002]
[Description of the Prior Art] The conventional AM radio set is constituted like drawing 2 , and when the level of the receiving RF signal generated from the RF tuning circuit 52 becomes more than predetermined, the RFAGC circuit 57 and the attenuation control circuit 58 start actuation. The RFAGC circuit 57 reduces the base electrical potential difference currently impressed to the base of the AGC transistor 61, and restricts the current supplied to the drain of FET62 of the RF amplifier 51. Moreover, the attenuation control circuit 58 restricts the level of the receiving RF signal to which a part of receiving RF signal which "was made to turn on the PIN diode in an attenuation circuit 59", and minded the antenna is impressed by the ground at the gate of FET62 of a sink and the RF amplifier 51 by impressing an electrical potential difference to an attenuation circuit 59. Thus, he was trying for the level of a receiving RF signal not to become more than predetermined.
[0003]
[Problem(s) to be Solved by the Invention] However, in AM radio set of drawing 2 , when a receiving RF signal is impressed to FET61, FET is a nonlinear device and a higher harmonic generates it from the square property. That is, when IDDS and the electrical potential difference between the gate sources are set to VGS and pinch off voltage is set [the current which flows to a drain] to VP for ID and a saturation drain current, the drain current of FET is [0004].
[Equation 1]

$$I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_P^2}\right)^2 \quad \cdots\cdots (1)$$

[0005] It is expressed. Here, it is [0006] when two signal VGS=m1sinw1 t+m2sinw2t (w1 and w2 are the angular frequency of two signals, respectively) is impressed to the gate of FET.
[Equation 2]

$$I_D = I_{DSS}\left\{1 + \frac{2m_1 \sin w_1 t + 2m_2 \sin w_2 t}{V_P^2} + \frac{1}{V_P^4}\left(\frac{m_1^2 + m_2^2}{2} - \frac{m_1^2 \cos 2w_1 t + m_2^2 \cos 2w_2 t}{2}\right.\right.$$

$$\left.\left. m_1 m_2 \cos(w_1 + w_2)\, t + m_1 m_2 \cos(w_1 - w_2)\, t\right)\right\} \quad \cdots\cdots (2)$$

[0007] The higher harmonic of w1, w2, 2w1, 2w2, w1+w2, and w1-w2 occurs from a next door and FET. That is, the signal of frequencies f1 and f2, 2f1, 2f2, f1+f2, and f1-f2 occurs. For example, if the station frequency of choice is set to f2 and other stations are set to f1 (=1/2xf2), since, as for the twice as many higher harmonic of f1 as this, a frequency will be set to f2, 2f, the higher harmonic of 1 is not intercepted by RF tuning circuit, but passes through a MIX stage and IF stage, and is detected. Therefore, when a broadcasting station exists in the frequency of f1, AM radio set generates interference. Moreover, if the broadcasting station of choice is set to f2 and other stations are set to f1 (=2xf2), the higher harmonic of f1-f2 of f1 will be set to f2, and interference will occur like ****.

[0008] Although a higher harmonic did not occur from FET and active jamming did not occur when the signalling frequency whose level other than the office which generates said 2 signal active jamming is size was impressed, although AGC sensibility was always raised in AM radio set of drawing 2 in order to control interference by the above-mentioned 2 signal active jamming, desensitization occurred and there was a problem that the sensibility of the broadcasting station of choice was stopped low.

[0009]

[Means for Solving the Problem] In AM receiver which accomplished this invention in view of the above-mentioned point, and was equipped with the AGC circuit A means to make a station with one [of the broadcasting station wishing the account of receiving back to front of the broadcasting station of choice / at least] twice or 1/2 twice as many frequency as this receive, It is characterized by having a means to detect whether the field strength of said station is predetermined level, and a means to make it operate so that a broadband RF signal may be impressed to a mixing circuit, while raising the sensibility of an AGC circuit, when said field strength is more than predetermined level.

[0010] Moreover, it is characterized by having a means to make an active jamming station with the 1/2 and twice as many frequency of the broadcasting station wishing the account of broadcasting station of choice receiving back to front as this receive.

[0011]

[Function] If it depends on this invention, after AM radio set receives the broadcasting station of hope, a broadcasting station with the twice and 1/2 twice as many frequency of the broadcasting station frequency of choice as this will be received, the field strength of each broadcasting station will be detected, and it will distinguish whether it is more than predetermined level. When field strength is judged to be the level more than predetermined, while RF broadband signal is made to be impressed from RF narrow-band signal to a mixing circuit, the sensibility of an AGC circuit is raised. Then, AM radio set receives the broadcasting station of choice, and serves as normal operation.

[0012]

[Example] Drawing 1 is drawing showing one example of this invention. The attenuation circuit which 1 decreases an antenna and 2 makes decrease a receiving RF signal, RF amplifying circuit where 3 amplifies a receiving RF signal, The change-over circuit where RF tuning circuit where 4 aligns a receiving RF signal, and 5 choose the wideband amplifier, and 6 chooses the output of the RF tuning circuit 4 or the wideband amplifier 5, The mixer with which 7 generates an IF signal, the IF amplifier with which 8 amplifies an IF signal, The wave detector with which 9 detects an IF signal, OSC in which 45 generates a station dispatch number, The PLL circuit where 10 controls OSC45, the S meter circuit where 11 detects the field strength of a broadcasting station, The 1st amplifying circuit where 12 amplifies a controller and the output signal which generates 13 from the end of resistance 34, The 1st level detector where 14 detects the level of the signal generated from the 1st amplifying circuit, The 2nd amplifying circuit where 15 amplifies the signal generated from the change-over circuit 6, the 2nd level detector where 16 detects the level of the signal generated from the 2nd amplifying circuit, It is the RFAGC circuit where 17 generates an AGC circuit, and the attenuation control circuit where 18 controls the magnitude of attenuation of an attenuation circuit, and 19 and 20 are AGC transistors with which an AGC signal is impressed to the base.

[0013] Moreover, in drawing 1 , an attenuation circuit 2 consists of the capacitor 21 and PIN diode 23 by which the series connection was carried out, and PIN diode 22 to which a cathode is connected at the node of a capacitor 21 and PIN diode 23. The RF amplifying circuit 3 is constituted by FET31 by which a receiving RF signal is impressed to the gate. The RF tuning circuit 4 consists of the coil 41 connected to the collector of a transistor 19, a coil 41, the capacitor 43 which has accomplished RC parallel circuit, and the varicap capacitor 42. Moreover, the wideband amplifier 5 consists of the resistance and the coil which are connected to the drain of FET31 and FET31 used as the RF amplifier 3 and combination through the AGC transistor 20.

[0014] Next, actuation of AM radio set of drawing 1 is explained with reference to the flow chart of drawing 3 . In drawing 1 , as initial condition in S2, the change-over circuit 6 was chosen by the controller 12 so that the output signal of RF tuning circuit might be generated, and it has accomplished the amplification factor of the 1st and 2nd amplifying circuits with the 1st amplification factor. It is amplified in the RF amplifying circuit 3, frequency selection is made in the RF tuning circuit 4, it is mixed with the station dispatch number of OSC45 in a mixing circuit 7, and the receiving RF signal inputted into the antenna 1 is changed into a predetermined IF signal. And a channel selection is performed by carrying out adjustable [of the tuning frequency of the RF tuning circuit 4] at the same time it carries out adjustable [of the frequency of the station dispatch number of OSC45].

[0015] The broadcasting station of choice is received in S3. The frequency of the broadcasting station of choice is set to fD. In S4, a controller 12 controls the PLL circuit 10, carries out adjustable [of the local oscillation

frequency generated from the tuning frequency and OSC45 of the RF tuning circuit 4], and makes it a broadcasting station twice the frequency of of choice, and the receive state of 2xfD. The field strength of the broadcasting station of frequency 2xfD is detected by rectifying the IF signal generated from IF amplifier 8 in the S meter circuit 11 with this condition. The field strength value generated from the S meter circuit 11 has it distinguished in a controller 12 whether to be larger than the predetermined level A. When said field strength value is smaller than predetermined level, it moves to S5.

[0016] Moreover, in a controller 12, before the PLL circuit 10 is controlled, also when frequency 2xfD does not exist in a receiving band, it moves to S4, and when it exists, above-mentioned actuation is performed. It moves to S5, and like S4, when a controller 12 controls the PLL circuit 10 and it considers as the receive state of 1/2 twice and 1/2xfD of the broadcasting station frequency of choice, in a controller 12, frequency 1/2xfD distinguishes whether it exists in a receiving band. When it is in a receiving band, the PLL circuit 10 is controlled so that a receiving RF signal serves as a frequency of 1/2xfD. The S meter circuit 11 detects the field strength of the broadcasting station of frequency 1/2xfD in this condition. In a controller 12, it is distinguished whether the detected field strength is larger than the predetermined level B. When smaller [than the predetermined level B] and it distinguishes, or when there is no frequency 1/2xfD into a receiving band, it moves to S7.

[0017] Moreover, in S4 and S5, when a controller 12 distinguishes the field strength detected from the S meter circuit 11 as it is the magnitude more than predetermined level, it moves to S6 and a controller 12 generates a change-over signal in the change-over circuit 6, and the change-over circuit 6 switches so that the output signal of the wideband amplifier 5 may be impressed to a mixing circuit 7. Moreover, a controller 12 controls the 1st and 2nd amplifying circuits 13 and 15, and accomplishes the amplification factor of the 1st and 2nd amplifying circuits 13 and 15 with the 2nd larger amplification factor than the 1st amplification factor. It moves to S7 after the above actuation.

[0018] In S7, a receiving RF signal is returned to fD, and AM radio set receives the broadcasting station of choice, and becomes normal operation. In normal operation, the output signal generated from the end of resistance 34 is amplified in the 1st amplifying circuit 13, and is impressed to the 1st level detector 14. In the 1st level detector 14, the level of the output signal generated from the end of resistance 34 is detected by carrying out V-I conversion. The output signal generated from the end of resistance 34 expresses the magnitude of the current which flows to FET31. Moreover, the output signal of the change-over circuit 6 is amplified in the 2nd amplifying circuit 15, and is impressed to the 2nd level detector 16. In the 2nd level detector 16, the level of the output signal of the change-over circuit 6 is detected by carrying out V-I conversion. The RFAGC circuit 17 and the attenuation control circuit 18 operate according to the detection current generated from the 1st and 2nd level detector. When the RFAGC circuit 17 controls the base electrical potential difference impressed to the AGC transistors 19 and 20, based on said detection current, by controlling the electrical potential difference between the source drains of FET31, the amplification factor of the RF amplifying circuit 3 is controlled, and the attenuation control circuit 18 controls the level of a receiving RF signal by attenuating a receiving RF signal by controlling the electrical potential difference impressed to an attenuation circuit 2. AGC actuation is performed by the above actuation.

[0019]

[Effect of the Invention] Since the level of a receiving RF signal is low restricted by raising the sensibility of an AGC circuit while switching to the wideband amplifier which does not have a nonlinear device from RF tuning circuit with a nonlinear device, when a broadcasting station with the twice and 1/2 twice as many frequency of the receiving station of choice as this has the field strength more than predetermined level, if it depends on this invention, generating of interference can be suppressed.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing one example of this invention.
[Drawing 2] It is drawing showing the conventional example.
[Drawing 3] It is a flow chart explaining actuation of an example.
[Description of Notations]
1 Antenna
2 59 Attenuation circuit
3 51 RF amplifying circuit
4 52 RF tuning circuit
5 Wide Band Amplifier Circuit
13 15 The 1st and 2nd amplifying circuits
14 16 The 1st and 2nd level detector

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